Class 09

Topics
- Tandem Queue
- Parameters on Edges
- Transfer line
- Multiple Server Queue with Explicit Tally of Delay in Queue and Time in System

Reading
- "Extensions" section in "Basic Event Graph Modeling"
- Look at Simple Inventory System

Discrete Event Simulat
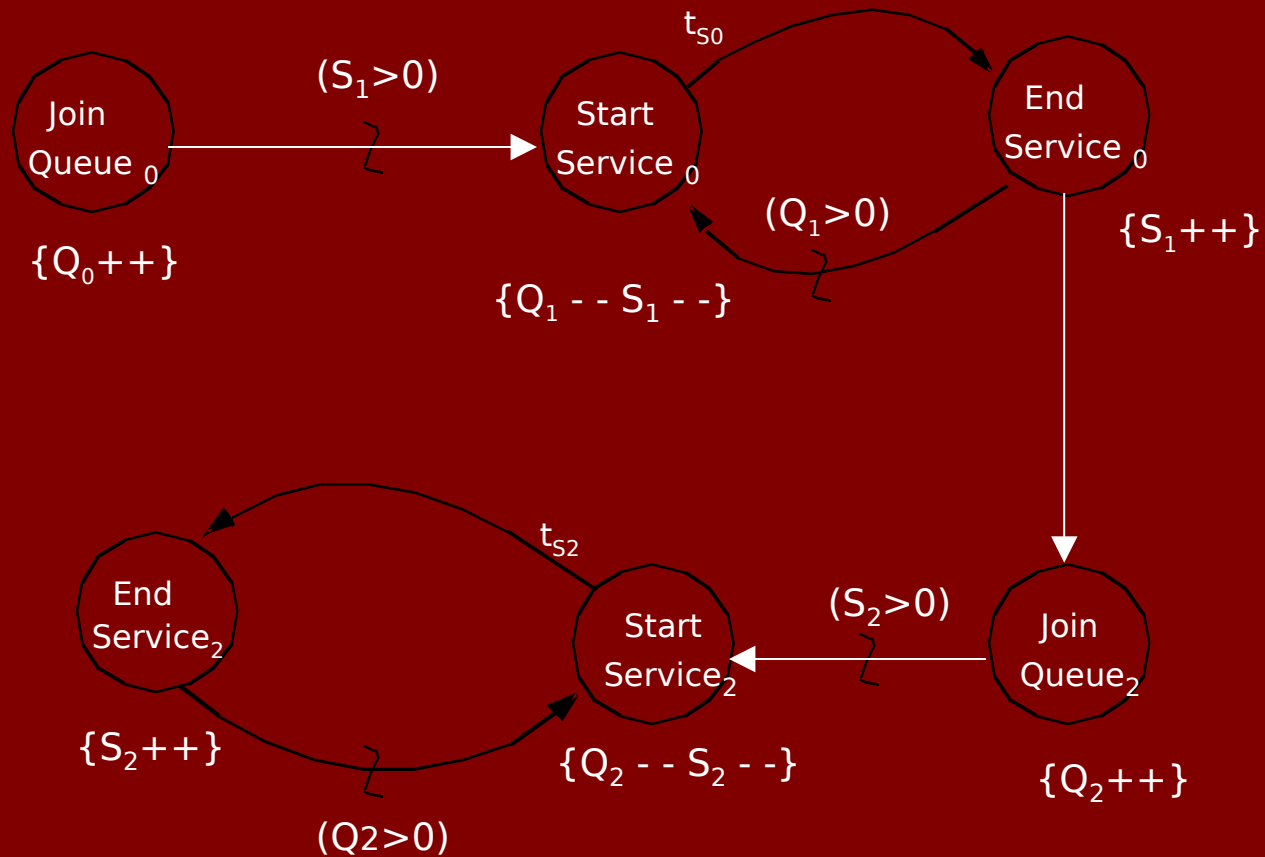ion Modeling

Tandem Queue

- Use equivalent of "cut&paste"

Parameters

- K_i = # servers at station i (i = 0,1)
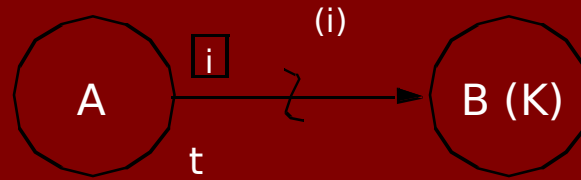- $\{t_{si}\}$ = service time at station i (i = 0,1)

State

- Q_i = # in queue at station i (i = 0,1)
- S_i = # available servers at station i (i = 0,1)

Event Graph

Join Queue $_0$ {Q_0++}

(S$_1$>0)

Start Service $_0$ {Q_1 - - S_1 - -}

t_{S0}

End Service $_0$ {S_1++}

(Q$_1$>0)

End Service$_2$ {S_2++}

t_{S2}

Start Service$_2$ {Q_2 - - S_2 - -}

(S$_2$>0)

Join Queue$_2$ {Q_2++}

(Q2>0)

Discrete Event Simulat ion Modeling

Parameters on Edges

- When event A occurs, then if (i) is true, schedule event B with delay of t.
- When event B occurs, the value of its argument K is equal to the value of expression j when it was originally scheduled.
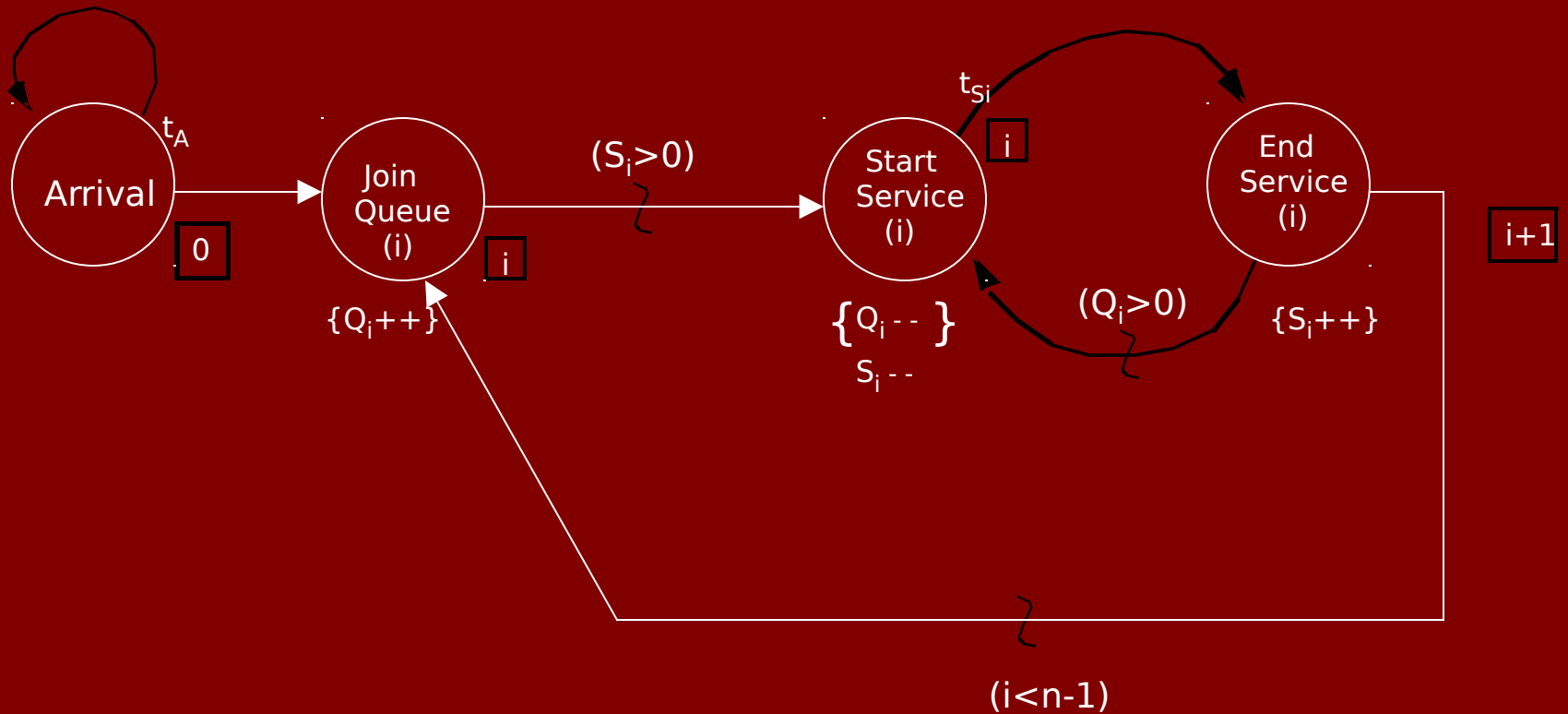
Transfer Line

Parameters

- N = # work station
- K = # servers at station i (i = 0,...,n-1)
- $\{t_{si}\}$ = service times at station i (i = 0,...,n-1)
- $\{t_A\}$ = interarrival times

State

- Q_i = # in queue at station i (i = 0,...,n-1)
- S_i = 3 arrival servers at station i (i = 0,...,n-1)

Discrete Event Simulat
ion Modeling

Event Graph

Arrival t_A

0

Join Queue (i)   i

$\{Q_i++\}$

$(S_i>0)$

Start Service (i)   i

t_{Si}

$\{Q_i--\}$

S_i--

$(Q_i>0)$

End Service (i)

$\{S_i++\}$

i+1

$(i<n-1)$

Discrete Event Simulation Modeling
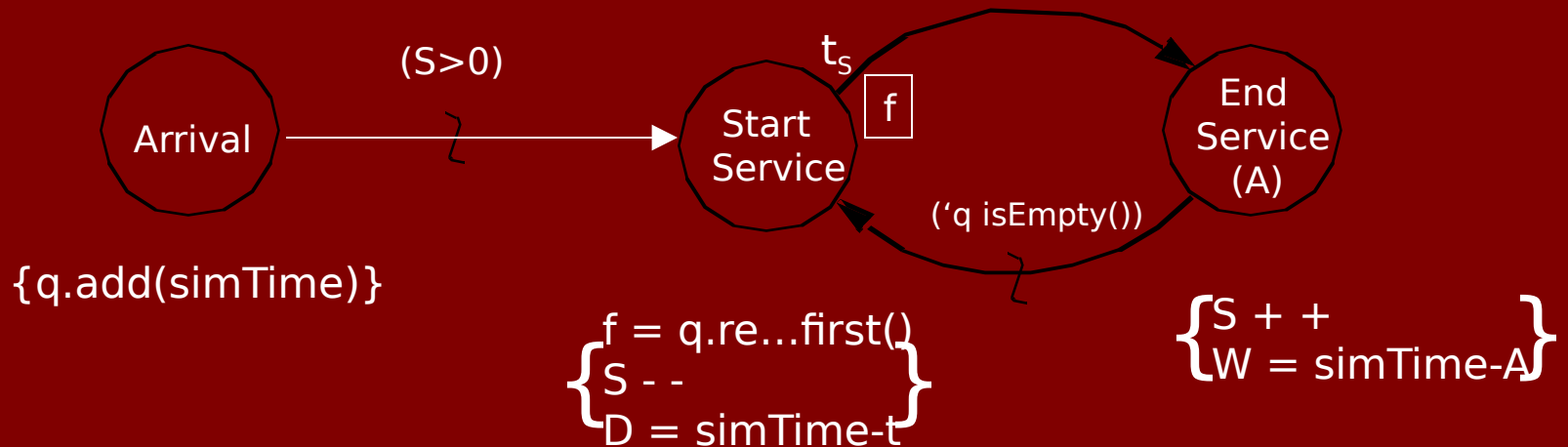
Multiple Server Queue
Explicit Tally of Time in Queue and System

Parameters
- $\{t_A\}$ - interarrival times
- K - # servers
- $\{t_S\}$ - service times

State
- S - # available servers
- q - FIFO container of arrival times
- D - delay in queue
- W - time in system

Discrete Event Simulat
ion Modeling

Event Graph (Server Only)

Arrival

(S>0)

t_S

f

Start Service

End Service (A)

('q isEmpty())

{q.add(simTime)}

$\left\{\begin{array}{l} f = q.re...first() \\ S - - \\ D = simTime-t \end{array}\right\}$

$\left\{\begin{array}{l} S + + \\ W = simTime-A \end{array}\right\}$

Note: D and W are assumed to be tallied by some statistical object.
In Simkit, a Property change Event would be fired, and a SimP6 Stats Tally instances would liste

Discrete Event Simulat
ion Modeling